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EDITORIAL

IT MAKES YOU THINK

Each week, for several years now, the Ministry of Agriculture has issued an agriculture/horticulture report, one of the purposes of which is to indicate price trends as shown in returns from various markets and since, week by week, the sources of this valuable information are the same, it is fair to assume that such trends as are indicated are pretty reliable.

In the horticultural section, information is obtained from the markets at Birmingham, Bristol, Cardiff, Leeds, Liverpool, London (Covent Garden), Manchester, Newcastle and Nottingham which should provide a fair sample of the markets throughout England.

If the prices given for 1959 are compared with those for 1958. a clear trend picture quickly emerges. And that brings me to the point at issue. Fifteen different weeks were selected at random although care was taken to see that a sample week was taken from each month throughout 1959 and each of these fifteen was compared with its exact opposite number for 1958. This examination revealed that, according to these Ministry figures, the average price for mushrooms in 1959 was almost exactly what it was for 1958! Now in 1958, as the MGA survey of that year revealed, mushroom production rose by about 28%. It is fair to assume that production in 1959 also showed a substantial increase over 1958. That being so, why was it that the market returns remained steady?

Could it be that publicity is at last paying off? Is it true, after all, that the T.V. campaign from Birmingham during the summer was the failure it was made out to be although the MGA Executive Committee rejected this conclusion on the grounds that, in view of the extremely hot weather, insufficient information was available in order to reach a sound conclusion?

A drop of 3d. per lb. on an annual production figure of 40,000,000 lb. represents, in round figures, £500,000. Is it really possible that

increased publicity did result in more stable prices? Did it save growers 2d. or even 3d. per lb.? It certainly could have done for the 1958 figures showed a drop of 3d. on those for 1957 which, in turn, were 3d. below those for 1956. That £7,000 paid by growers for publicity could have been one of the best investments of all time and in pondering these things it is as well to remember that what comes down can go up. WRA.

INDUSTRY RECOGNISED AT LAST

OFFICIAL

Something which the MGA has fought for since the Association was first formed—official recognition by the powers that be—has at last been fulfilled.

In the Fourth Report of the Agricultural Improvement Council for England and Wales,* covering the period 1956-59, paragraph 84 reads: Diseases of Mushrooms. The Horticultural Committee discussed this subject with the Director of the Glasshouse Crops Research Institute where work on this crop is now being done. The disease problem is very serious at the present time, especially as little is known of the cause of Watery Stipe, symptoms of which (under different names) have been observed for 20 years at least. Survey work has been done by the NAAS on the status of the disease and some observations being made at the Experimental Horticulture Stations will help in the investigations. The value of the crop is such that it ranks second in importance on the list of horticultural crops grown under protection.*

* Available from Her Majesty's Stationery Office, price 2/-.

MUSHROOM PILFERING IN COVENT GARDEN

Fifteen People Sent for Trial

At Bow Street Police Court on Tuesday, January 5th, fourteen Covent Garden night porters and one long distance lorry driver appeared on remand, charged with conspiring together with others not in custody, to steal fruit and vegetables from traders in Covent Garden Market.

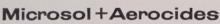
According to reports in the *Fruit Trades' Journal*, the police, with an employer concerned, kept watch on two nights early in December, the Police being in two groups. It was stated that, among other things, the police watchers saw mushrooms unloaded from a lorry. Whilst the chips of mushrooms were being unloaded, mushrooms were taken from various chips and put into empty chips. The chips from which the pilfering was alleged, were then stacked normally and left, whilst the stolen mushrooms were weighed later.

It was stated by P.c. Gordon Hudson that he saw one of the defendants unloading chips of mushrooms and he saw him put his hand under the covers of each chip and take out some mushrooms. This same defendant, and another, were also seen to move to another trolley loaded with mushrooms, and both then pilfered mushrooms from various chips.

The charges concerned various produce in addition to mushrooms and, as stated, all fifteen accused were sent for trial, each being allowed bail with a surety of £50.

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WHO'S WHO:

Dr. H. J. TSCHIERPE



Photo by: F. C. Atkins

Dr. Hans-Joachim Tschierpe, 30 year old German scientist, has translated into English his doctorate thesis, "Studies on the Influence of Carbon Dioxide on the Cultivated Mushroom", and we are to publish it serially in the MGA Bulletin over the next few months, starting with this issue. We asked him for a brief autobiography; he replied:

There is not much to say. I was born in 1930 near Berlin and come from a family, whose members are farmers, gardeners, public officers and lawyers.

From 1936 to 1949 I went to school and made my school-leaving-examination (at a secondary school) which entitled me to matriculation at a University. Then I worked for nearly three years in horticulture firms and started my studies in

1952 at Berlin's Technische Universität. I studied horticulture, a little bit agriculture, a little bit chemistry, microbiology, botany, etc.

I left student's life in 1956 with a diploma and started at once with experimental work about mushrooms and CO_2 in order to write my doctor's Thesis. I worked at the Institute for vegetable crops at the Technische Universität Berlin and on a modern mushroom farm in Berlin.

My first appearance in public with an article "50 years mushroom growing—without progress?" made a lot of mushroom growers very angry. The only thing I did was to compare a fifty years old article (after a lecture of an old German Gardener, who grew mushrooms for our old Kaiser in Sans-souci, in Potsdam, near Berlin—the German Versailles) with "modern" German post-war literature. From this comparison I had the impression that there was really not much progress. That was what I said. I said it in an unpolite manner. Some growers are still angry with me.

In order to become more acquainted with mushrooms I made a trip through England in 1957 and visited some very good mushroom farms. I had a wonderful time in your country and was deeply impressed by the hospitality and the long and frank talks with British growers and Scientists.

Being in Germany again I wrote a short article about my trip through England and Scotland, in which I told to the German Growers how you obtained progress. It was of course, not my doing, but now in Germany more modern farms are built; the natural development

goes this way. But maybe I helped to give the impulse for more frank discussions about mushroom problems.

My doctor's thesis was finished just before Christmas 1958 and two days before Christmas I left the examination board with "magna cum laude" as a very happy young doctor. For the Copenhagen Conference I divided my thesis into three parts and gave three lectures about my work. At the moment I am working on casing soils and the cultivation of Sporophores in Liquid Media.

PART I

STUDIES ON THE INFLUENCE OF CARBON DIOXIDE ON THE CULTIVATED MUSHROOM

By Dr. H. J. Tschierpe

Institut für Gemüsebau der Technischen Universität Berlin Direktor Prof Dr. H. Riethus

(The original paper was published in "Die Gartenbauwissenschaft 24, 1, 18-75, 1959)

A. Introduction

Successful mushroom cultivation depends on the aeration of the compost during composting and on the ventilation of the rooms used for the cultivation. In too wide or too high compost heaps anaerobic zones will develop. These zones cannot reach the temperature necessary for changing the starting material into mushroom compost (Lambert and Davis, 1934). Under anaerobic conditions composted material remains "green" and can hardly be used by the mushroom mycelium. Stoller (1943) obtained 2.5 lb./sq. ft. from compost, composted in small piles. The yield per square foot was reduced to 1.5 lb. when the material was composted in large heaps (9 feet wide, 4 to 5 feet high). In the latter case the centre of the heap developed a big anaerobic core. All the methods for shortening the composting period (Stoller, Smith and Brown, 1937; Lambert, 1941; Sinden and Hauser, 1950 and 1953) presuppose a sufficient aeration of all parts of the compost. According to Sinden and Hauser (1950, 1953) the oxygen content of the air in the compost during composting ought to be 2 volume per cent or more. The same authors declare (estimate), that the lowest oxygen content of the air in the peak-heating room during pastuerization has to be at least 15 per cent. This level can only be kept by ventilation with fresh air. In order to avoid high temperature differences a steady air-movement in the peak-heating room is necessary. And lastly compost peakheated with insufficient oxygen tends to be infected by Chaetomium (Lambert, 1958).

A decrease of pore space of the compost by adding water causes a retardation of the mycelial growth; if the pore space becomes zero, growth is stopped (Styer, 1930). In bottles filled with compost and tightly closed the growth of mycelium is inhibited (Lambert, 1958). Increased ventilation improves the growth rate of mycelium in submerged culture (Humfeld and Sugihara, 1949). Szuecs (1950) points out,

that ventilation of a mycelium culture is necessary for removing the growth-destroying carbon-dioxide: "A lower rate of air flow may be used, provided... the rate of air passage is sufficient to maintain the carbon dioxide concentration below that which would destroy the growing organism (the tolerance of the growing organism for carbon dioxide is known to the art)". The author mentioned does not say how big this amount is. **Treschow** (1944) believes that the mycelium growth is not influenced by the absence of continuous renewal of air. According to **Sinden** (1947), under commercial conditions during the spawn-running "no air" is necessary. **Mader** (1943) characterizes as "excellent" the spawn run in compost-filled trays, standing in a closed room.

The yield from these trays, however, was only 50 per cent of that from trays, which stood during the spawn-running period in a ventilated room.

In practice the mycelium-impregnated compost is covered with soil in order to induce fructification. With sufficient ventilation the first sporophores are ready for picking 19 to 25 days later. Even to-day the function of this casing soil is not quite clear. It is only known that for fructification, besides the application of the casing soil, fresh air is necessary. In unventilated cropping rooms "the mycelium will rush up to the surface...and...spread widely...all over the surface of the bed, knitting together until a mat is formed which will hinder watering and aeration" (Atkins, 1957).

Bels-Koning (1950) observed for a period of nine months a vigorous vegetative growth of mycelium on the casing in a cave with insufficient ventilation. With an improvement of the ventilation however, sporophores developed, and they appeared first near the openings admitting fresh air. "According to old grower's experience the 'white' runs for days over beds without fixing itself, i.e., as the mycelium strands spread on the surface the hyphae are not able to entwine to the conglomerates of sporophores" (Magnus, 1906).

Sporophores that grow in badly ventilated cropping rooms often develop into abnormal forms: the stem thickens at the base and grows abnormally high, whilst, at the same time, the growth of the cap is inhibited. At the turn of the century people were already talking about stifling" mushrooms, at the appearance of such abnormalities. Lambert (1933) showed, that carbon dioxide can have a morphogenic influence of this kind to the sporophores. The stem elongation and the cap inhibition appears to a very great extent at a concentration of 1.8 volume per cent CO₂. More than 5% CO₂ leads—according to Lambert —to a complete inhibition of growth. Mader (1943) from his experiments comes to the conclusion that ventilation of mushroom houses is necessary in order to get rid of an unknown volatile substance that is produced by the mycelium or by the microflora of the compost. The chemicals successfully used for the absorption of the volatile substances suggested according to Mader, that the substance is an unsaturated hydrocarbon. According to Stoller (1945, 1952a) the sporophore malformations already mentioned also appear in "complete absence" of CO₂. He supposes that the malformation would be caused by a metabolic product of the nature of quinone, which is produced by the mycelium. **Mader** and **Stoller** too believe that these hypothetical substances have an influence on the form of the fruitbody as well as a physiological influence on the fruiting process.

Bels-Koning supposes that the ventilation essential for fructification is necessary for creating a water gradient between the compost and the surrounding air. According to a hypothesis developed by Schisler, the mycelium produces a hormone-like substance of high molecular weight and low volatility. A low concentration of this substance stimulates fructification, whilst it is inhibited by high concentrations. Sinden (1958) too has the opinion that besides the carbon dioxide there exists another physiologically "extremely active" substance.

As a result of **Lambert's** experiments (1933) the "American school" of to-day (**Stoller**, **Mader**, **Sinden**, **Schisler**) is inclined to believe, that only concentrations of more than 1-2 volume per cent CO₂ hurt the sporophores and have a morphogenic influence on them. Such high concentrations, however, are not to be expected under commercial conditions; therefore the influence of carbon dioxide could be neglected.

Kindt (1958 a, b) on the other hand mentioned experiments, in which already concentrations greater than 0.3 to 0.5 volume per cent CO₂ would have an influence on the form of the fruitbody. According to recent experiments by **Plunkett** (1956), Collybia velutipes reacts to CO₂ concentrations between 1 and 5 per cent with an elongation of the stipe and—at the same time—inhibition of the cap growth. The following experiments were carried out in order to help in establishing the importance of carbon dioxide not yet fully known for the cultivated mushroom. The paper has four parts. In the first part are reported measurements of the CO₂ content of the air in the compost and of the air in cropping rooms under commercial conditions. The second part deals with the influence of carbon dioxide on the growth of mycelium. Experiments about the influence of CO₂ on the sporophores can be found in the third and fourth parts of the paper. Experiments of other authors about CO₂ determinations during the composting period are mentioned for completeness at the beginning.

For the fruitbodies in the different stages of development the names recommended by **Flegg** and **Gandy** (1954) are used. According to this we have to distinguish four stages:

- 1. Pinhead: The earliest stage, cap and stem not always readily distinguishable, no veil visible.
- 2. Button: Cap and stem readily distinguished, veil visible but unbroken.
- 3. Cup: Veil partly or completely broken, outer surface of cap still visible from directly underneath.
- **4.** Flat: Cap extended to form—in cross section—a T with the stem, upper surface of cap not visible from below.

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YORKSHIRE MANURE DEALER FINED

Load 47% Underweight.

At Morley (Yorks.) Court on 2nd January, Herbert Colin Langstaff, manure dealer, of 30 Scotchman Lane, Morley, and his employee, John Colin Lawrence of Richmond Lane, Barwick-in-Elmet, pleaded guilty to unlawfully applying a false trade description purporting to represent a weight of 8 tons, 6 cwts of stable manure, delivered to Mr. Hartley Barraclough, Westerton House Farm, West Ardsley, when in fact the weight was found to be 4 tons 7 cwts. 2 qrts., a deficiency of 47%, Langstaff was fined £50 with 10 guineas costs and Lawrence was fined £20.

The Town Clerk of Morley, Mr. E. V. Finnigan prosecuted and said Langstaff supplied manure to mushroom growers in the district and it was the normal practice to tip the manure and then produce a weight ticket. On 23rd July, Det. Sgt. Pearce with Mr. Morley Hedley, the Borough Weights and Measures Inspector, were present when the load of manure in question was delivered to Mr. Barraclough's farm. There was a difference of £11 in favour of the seller.

Mr. Barraclough said he had been doing business with Langstaff for some time. Langstaff charged £3 per ton for stable manure. An entry in the delivery book, produced by Lawrence, gave the weight of the load as 8 tons 6 cwt.

Mr. Hedley told the Court that the lorry and its load were weighed and the gross weight was 8 tons 8 cwts 2 qtrs. The lorry on its own weighed 4 tons. 1 cwt.

Det. Sgt. Pearce said that Lawrence(the lorry driver) when questioned said Langstaff had given him the delivery book and weight ticket and he (Lawrence) did not know that the load had not been weighed or that it was short weight.

Mr. George Handley, of the weighbridge firm concerned (Pawson's) said there were no entries of weights made on 23rd July even though the ticket produced by Lawrence had a "Pawson" heading.

Langstaff, in evidence, said that each driver was instructed to go on a weighbridge before each load was delivered. He denied putting figures into the delivery book or on to the weight ticket for the Barraclough load.

When it was suggested, under cross examination, that the load might not have been weighed Langstaff replied "Yes, it could have been a guess, and a poor guess at that".

IN-DIGEST-IBLE . . . IGNORANCE AND STUPIDITY

By STANLEY MIDDLEBROOK

There's no tonic like a run of good crops. You've seen it before and you'll see it again. It happens to you; it happens to me. We come out of a bad period and straightway our heads and noses go up in the air. We brag our way round the country; we know all. We travel first class again. Our cars grow bigger and bigger. Our cigarettes become cigars and our jar of mild becomes a magnum of champagne. One day the bank manager is our master, the next he's our servant.

But our financial ups and downs are tame compared with our gigantic shifts from knowledge to ignorance and back again. I recall an incident of two years ago with amusement. Our crops had flopped and we were daily sinking into the pit of despair. Concurrently a Southern grower mounted to the top of a glorious wave from the deepest trough he'd every known or could wish his worst enemy. At this point his knowledge became profound and the future for several decades ahead was secure. I moaned, but he would neither believe me nor try to understand my abyssmal ignorance and depression. In my plight I offered him £1,000 to come and put us right. He accepted, but somehow he didn't come. I suspect his top heavy cropping kept him at home, and £1,000 had become chicken feed. Time went on and we sank deeper and deeper. Then came the telephone call. "What about that £1,000?" he asked, "are you still on?" "Certainly," I replied, "come up as soon as you can." There was a pause. Then, "I think you're not with me," he said; "I'm offering you £1,000 to tell me what's gone wrong with my crops." So then there were two of us. I imagine he's "up" again now. He's not the sort to stay down long.

I was pleased to read Ernest Palfrey's attack on the unknown retailer. Why is objecting to an iniquitous levy a sign of dishonesty? The inference was a bit rich coming from a member of a fraternity which, through some form of laziness, would rather sell 12 heads of lettuce at 1/- each than 24 at 6d., thus at once depriving the public of cheaper food and the grower of a living—for in so many instances the grower can't get a picking and packing price for his lettuce while a mile or two away a retailer is extorting 1/- a head from a complaining but helpless housewife. This scandalmonger should put his own shop in order first.

When visible signs of our Brown disease vanished cropping remained poor for many months. One authority told me the disease would probably go when good cropping returned. Another suggested the "possibility of an unseen growth-inhibiting effect remaining in or around the houses could not be dismissed". The first was obviously wrong; the second played for safety! Knowledge unchallenged; science vindicated; clarity everywhere.

Cecids come and cecids go. Do they come because you've stopped powdering? Do they go because you've powdered them to eternity? Not a bit of it. They come and go regardless. There's clarity for you.

Truffle comes and goes, too, of its own accord. Or does it? We have a theory! Is there a grower anywhere with a clean little farm out in some salubrious fertile countryside who would let us try it out? We would undertake for a nominal sum (to remind him of his and our stupidity) to give him an attack of Truffle that he could have the pleasure of studying at leisure for a long time. Knowledge unchallenged?

Dear Sir. We agree we are living in an age of initials. The following are a few of those used in our current recording system. DO, W, X, DC, XX, WF, MB, XXX, TB, BB, TVO, BVO, MBL, BBR, TBR, XXXeTB, SD, O, C, L, H, F, and many others. The system is of course considerably simplified by the addition of an elaborate numerical code. We hope you find the information useful and practical. We've found it neither, in ten years. Yours sincerely, S.M. (MGA, BF).

If you have a good compost, make up deep beds to extract the most from it. To get the best out of a bad one put it in shallow beds or trays. There's a pearl of wisdom for you. Any questions?

- 1. "How dare you make this wild statement?"... Work it out for yourself!
- 2. "How do I know a good compost?"... What! After all these years?
- 3. "I'm a tray grower; how can I make deep beds?"... Ah, so you know you make a good compost do you? Then you should know better than to grow on trays.

 All stupidity? Well...maybe not.

Over the last six months we've suffered a lot of late deliveries on the markets. Salesmen have had to hold mushrooms over because the majority of their buyers have gone home before our supplies arrived, resulting in greatly reduced returns to us. A volley of complaints to British Railways brought us a posse of "top-steam" boys. We grumbled bitterly, irascibly, and in short blew our top at the incompetence and inefficiency of a company that undertakes at high cost to deliver our product to a certain point at a certain time and fails to do so and, worse still, refuses to compensate us for the financial loss involved.

The officials, by now debagged, blushing and confused, showed some signs of rallying as they threw down an ace:

- "Of course you know you are despatching your mushrooms at Owners' Risk Rate. What do you expect? Why don't you send at Company's Risk?"
 - "Would that prevent late deliveries?"
 - "Well-er-no."
 - "Then you would compensate us for loss?"

" No."

MUSHROOM RECIPE COMPETITION

On 26th January, the results of a Mushroom Recipe Competition organised by the 'Farmer & Stockbreeder' magazine were announced. The three prizes, presented by the MGA, were three pale blue, hide suitcases

and mushrooms to accompany each.

The competition attracted 280 entries and as judges we looked for the most attractive, practical and original recipes from this wide and very varied selection; I must admit that the third prize-winner's recipe was not particularly original, but she was the only competitor who used raw mushrooms.

Mrs. Costa and Miss Dacombe of the 'Farmer & Stockbreeder' had made their 'short list' by the time we met for the final judging.

The prizes were widely distributed as follows:—

First Prize: Mrs. Hazelrigg of Leicester, with a recipe called 'Jacket Steak'.

Second Prize: Mrs. Ellis Jones of Montgomeryshire, for her recipe 'Jenny's Savoury'.

Third Prize: Mrs. McGorty of Northern Ireland, a Salad recipe.

You may like to try the 'Jacket Steak' for yourselves:

2 lb. best quality steak Dripping and Butter for frying

Dripping and Butter for frying 1 lb. mushrooms

2 eggs

3 tablespoons chopped parsley Salt and Pepper

About 1 lb. of rough puff pastry. 10 shallots.

Seal the steak—which can be fillet or rump as long as it is in one compact piece—on all sides in very hot dripping to keep in the juices. Chop the mushrooms and shallots fairly finely and saute lightly in butter. While still hot, but off the stove, stir in the beaten eggs, chopped parsley and seasonings.

Pack this mushroom mixture round the steak and wrap the whole in rough puff pastry made in the usual way. (All can now be left in the refrigerator till wanted—overnight if necessary—so long as the steak and mushrooms are quite cold before wrapping in the pastry).

Bake for about 20 minutes in a hot oven—depending on the thickness of the steak—carve into slices, the thicker the better, and put a spoonful of the juice in the dish on each helping.

Valerie Baker

THAT COMPOST QUESTIONNAIRE

All Grower Members in the United Kingdom should have received a short questionnaire about used mushroom compost, the purpose of which is to ascertain the true position with regard to this valuable byproduct of the industry. The small sub-committee investigating the matter is to make a preliminary report at the next meeting of the MGA Executive Committee on February 23rd. One of the main purposes of this investigation is to ascertain the true position which exists today and it will be assumed therefore that those members who have not completed and returned the questionnaire are disposing of their compost satisfactorily and have no observations to make on the subject. Replies to the questionnaire will be welcomed at the MGA Office up to 20th February.

You can make better compost more quickly and reliably-with ADCO 'M'

SPECIAL MUSHROOM COMPOST ACTIVATOR GIVES
HIGHER FERMENTATION TEMPERATURES, AND A FIRST
CLASS COMPOST THAT ASSISTS THE SPAWN RUN

MANY ADVANTAGES are gained by using Adco "M" as an activator in composting. Chief among them is the higher temperature attained both in the compost heap and in the beds during the peak heating process. Look at the results that follow from these higher temperatures.

First of all, fermentation goes ahead at a faster rate. Composting takes less time and the finished product is ready earlier.

Secondly, you have greater assurance that your crop will be free of pests and disease. The higher temperature either kills off the pests inside the heap or drives them to the surface, where they can be dealt with by insecticides. High temperatures during fermentation are particularly vital in preventing disease such as Vert-de-gris, of which there is special danger when composting during the winter months.

More nourishment

If you use Racing Stable manure, or other manure in which excess straw is present, the use of Adco "M" is strongly advised. The fermentation of this type of manure takes place more rapidly and effectively when Adco "M" is added. You get a more thorough breakdown of the strawy material, which then becomes available as food for the growing spawn. So your compost provides more nourishment for the mushrooms, and you get a bigger crop.

Better spawn run

Adco "M" produces a good quality compost of even texture. It provides an

ideal medium for spawn run and helps to avoid greasy conditions, lack of aeration, and over wet compost – all of which delay mycelium growth. The spawn is able to make more rapid use of the food provided. It establishes itself more quickly and this is again a great help in preventing diseases and weed fungi. The faster the spawn grows and fills the compost the less likelihood is there of disease and weed fungi becoming serious competitors. A quick spawn growth also gives a quicker ultimate production.

You can have freedom from uncertainty in the composting process – by using Adco "M". It will pay you hands down. Adco "M" is specially formulated as a result of years of experiment, for the specific purpose of making mushroom compost. It can be used for composting with straw alone, if you wish. Or it can be used to compensate for variations in the quality and texture of your manure supply. Adco "M" provides the way to better mushroom compost every time.

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More and more Growers use

MOUNT Mushroom Spawn every month . . .

Two recent cases of exceptionally good cropping off

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One, a shelf grower who on successive crops picked in excess of 3,000 lbs. off 1,500 feet in the remarkably short picking time of 3 weeks 6 days



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A TALK ABOUT CECIDS

by I. J. Wyatt

Glasshouse Crops Research Institute, Littlehampton.

Your editor has asked me to outline for the MGA Bulletin a paper which I recently read to the Association of Applied Biologists. I have therefore rewritten the factual material from the grower's viewpoint.

The Cecidomyiidae which attack the cultivated mushroom reproduce by a most unusual method known as "paedogenesis". That is, the larvae are able to produce further young larvae within their own body. This process was first discovered in 1862 but it was not until 1926 that Dr. H. F. Barnes recognised these midges as pests of mushrooms and two years later concluded that they were paedogenetic. It is only since the war however that cecids have assumed any economic prominence. This is associated with the rapid expansion of the mushroom industry and the adoption of modern culture methods which often favour these pests.

Peak heating leaves the compost virtually free from insect life but the smell of freshly running spawn strongly attracts all kinds of pests. The minute cecid flies find their way from neighbouring mushroom houses and lay their eggs in the beds. Also, larvae can easily be introduced on clothing or dirty implements. Any cecids finding their way to growing mycelium, at once start paedogenetic reproduction. If *Heteropeza pygmaea*, the common white species, is taken as an example, it produces an average of 14 young in 8 days in the laboratory, while in the mushroom bed the figures are probably 7 young in 13 days. The population increases exactly logarithmically at this same rate until 9 or 10 weeks from spawning, by which time every single larva has produced some 60,000 descendants. As cropping falls off, so the cecid population stabilizes. Thus small numbers introduced at spawning can achieve enormous proportions during the cropping period.

Logarithmic population growth for so many generations is unknown in any other insect and this reflects the fact that the cecids are living in an ideal environment. They are protected from the outside world by a mass of virtually inexhaustible food; they have no enemies or diseases and seldom any competitors; they are carefully tended by the mushroom grower who waters them regularly and keeps them continually warm, and unlike other insects they seldom produce flying adults which can be attacked by insecticides.

Towards the end of cropping the mycelium seems less suitable for *Heteropeza* and the larvae often migrate from the beds in vast numbers. Many turn into flies which can infest freshly spawned houses, while still others become "resting mothers" with a toughened skin in which one or two young can remain protected for a year of more. Thus spent compost can be a source of reinfestation if not "cooked out".

There are three other cecids which attack mushroom crops in Great Britain. A newly discovered species Henria psalliotae from

Cornwall is closely related to *Heteropeza*. It is unusual in changing to a pupa before producing its young: as many as 96 at a time. *Mycophila speyeri* and *Mycophila barnesi* are better known. The former can reproduce at an even greater rate than *Heteropeza*, producing about 20 young in 6 days under laboratory conditions. Thus it can often attain phenomenal populations by the beginning of cropping, after which numbers decline. *M. barnesi* is less common and, taking 8 days to produce 19 young, does not reach high populations until later in the crop.

Growers are often heard to complain of serious crop losses or even crop failure due to cecids. In the past three years eleven cropping experiments have been carried out at the Glasshouse Crops Research Institute to investigate the prevention of such loss, but so far we have no evidence that cecids influence the total yield of mushrooms. Mycelium can apparently withstand the worst attacks, presumably by a continual regeneration.

Although cecids do not reduce total yields they can certainly cause economic losses in other ways, and it is typically in the *Mycophila* species that this is seen. Their larvae are bright orange and have a strong tendency to climb onto the mushrooms. When the larvae are numerous the mushrooms are quite unmarketable. 10 larvae of *M. speyeri* introduced to 6 eq. ft. trays at spawning spoiled 51% of the total yield in one experiment, mostly at the beginning of cropping. *M. Barnesi*, in the same conditions, caused 57% contamination, but towards the end of the crop. *Heteropeza* has a lesser tendency to climb, and, being white and inconspicuous, caused only 21% loss in the same experiment.

Heteropeza however, unlike the Mycophilas, is often associated with other disorders such as the so-called "nibbling of the gills." and "bacterial pit". As these are both probably bacterial troubles it is also possible that Heteropeza may disseminate other bacteria affecting the mycelium in the beds. This may explain the crop failures which growers claim.

The cecid is thus an insidious pest which multiplies unobserved, and only when it has reached uncontrollable numbers does it emerge and cause damage, merely by its presence. Research is in progress therefore to prevent, rather than to control, outbreaks. Attempts have been made to incorporate insecticides in the compost but the chemicals are liable to cause more loss than the cecids. More recently, insecticides have been mixed with the casing with very promising results: the larvae can still live in the compost but they are prevented from climbing onto the mushrooms. Finally, population studies suggest that larval numbers could be prevented from reaching a dangerous level merely by slowing the logarithmic growth rate. Future work may reveal that slight modifications of cultural methods could achieve this purpose.

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THREE 'WAYS OF GROWING'.

Three Mushroom growers live adjacent-Get-Rich-Quick, Wide-awake, Complacent; Though each believes that he is right They're all as different as day from night. Take the case of Get-Rich-Ouick Who grows his mushrooms all 'on tick', Tells his creditors of coming crops, Displays his bumpers, not his flops, And always jumping from this to that Has never a formula quite 'off pat' If asked to quote his method of growing, Bluffs it off, and, starts his blowing; Is always hunting about for tips Then swears they'll never cross his lips; When something gives a bumper flush Into it headlong he will rush, Till doping his compost off its legs He kills the goose to get the eggs. Behold his neighbour, Wide-awake! From him a pattern we should take— No shoddy lifeline will he grasp Nor any straw a-blowing past; He has grey hairs below his hat And much grey matter under that, For solving problems is his pride, And o'er them all to victory ride; Oft a-listening with open mind To 'Ways of Growing' of every kind He'd thoroughly test, time again, With trial plots and coster's pen Ere from his beaten path of Fate One jot or little he'd deviate. And, getting nowhere with his labour Complacent will long remain—a neighbour!

F.P.

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THE EDITOR REPLIES

Members will recall reading, in last month's *Bulletin*, a letter from Mr. E. Palfrey protesting about certain passages in an article in the December issue, which was reproduced from *The Fruit Trades Journal*. The Article written by "Retailer" suggested not too seriously, that maybe members who were not willing to support the MGA Publicity Fund might be responsible for short weight in some of the chips of mushrooms which he purchased from time to time. Part if not all of the answer to this short weight allegation may well be supplied on another page of this issue under the heading "Mushroom Pilfering in Covent Garden".

In addition to Mr. Palfrey, another member, Mr. R. L. Blake

has also written protesting.

The Editor would like to make it quite clear that the views of "Retailer" are not shared by the Executive Committee, the Publicity Committee, the Editorial Board or himself.

NOW: SUPER-SPAWNING

A number of growers are already using the shake-up spawning idea propounded in Copenhagen and Folkestone, 1959, by C. Riber Rasmussen, director of mushroom research in Denmark.

We now learn from Rasmussen that his Research Station has carried the work further, along lines which appear to show several advantages.

- 1. A batch of newly-pasteurized trays are planted as usual, i.e., broadcast or, preferably, through spawned. This is referred to as 'preliminary spawning'.
- 2. After two weeks (or however long it takes for the trays to be fully run), the compost from each tray is mixed with the compost from two newly-pasteurized trays and packed firmly. This is referred to as 'super-spawning'.
- 3. These super-spawn trays are cased immediately and either, (a) placed in a spawn running room for 4-7 days before being removed to a growing room or (b) placed directly in a growing room and held for 4-7 days at a spawn-running temperature. Thereafter, the normal procedure is followed.

The several advantages claimed are :-

- 1. Substantially less spawn is required, which is a useful economy.
- 2. At the 'super-spawning' stage large amounts of 'preliminary spawn' are mixed with the newly-pasteurized compost, resulting in a complete run in 3-5 days.
- 3. Trays are in crop about 20 days after (super) spawning.
- 4. The yield in the first cropping month is considerably increased.

This method, we are informed, has already been tested on several farms in Denmark and elsewhere and has proved valuable. "It is simple, but very effective" says Rasmussen. "I suggest everyone carries out a few trials; then they will be convinced. The advantages will readily be seen".

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1960 PUBLICITY CONTRIBUTIONS

Continued support for the MGA Publicity Fund is evident by the immediate response to the 1960 appeal, and those contributing to 22nd January this year are listed below.

It will be noted that some of the leading firms of salesmen are again to the fore in the field and their support, as well as that of other

branches of the industry, is most encouraging.

Members should note that the list of spawn merchants is incomplete, due to the fact that some of the firms, according to their systems of bookeeping, prefer to make their contributions every two or three months, rather than each month.

Saleshien .		T.	S.	a.	
Francis Nicholls Ltd., Smithfield Market, Birmingham		157	10	0	
T. J. Poupart Ltd., Covent Garden, London, W.C.2		115	10	0	
R. E. Jenkinson Ltd., Covent Garden, London, W.C.	, .	105	0	0	
Dan Wuille & Co. Ltd., Covent Garden, London, W.C		100	0	0	
Geo. Jackson & Co. Ltd., Smithfield Market, Birmingham		50	0	0	
Wm. Morgan & Co. Ltd., Custom House Street, Cardiff		5	5	0	
Ernest White Ltd., Kirkgate Market, Leeds		5	()	()	
*Spawn Merchants:					
H. Mount & Sons, Ltd., Littlebourne, Canterbury, Kent Monlough Food Production Co. Ltd., Ballygowan, Belfast					
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Sundriesmen:

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ANNUAL GENERAL MEETING

The Annual General Meeting of the Association, with the Annual Luncheon, will take place at The Connaught Rooms, Great Queen Street, Kingsway, London, (nearest underground station is Holborn), on Tuesday, 22nd March.

To avoid any curtailing of the meeting, thus giving reasonably adequate time for discussion, the Chairman's Reception will commence at 11 a.m., 11 a.m.-12 noon Chairman's Reception; 12 noon-1.30 p.m.

Luncheon: 1.30-5.30 p.m. Annual General Meeting.

As has been customary for many years past, members, their wives, friends etc., will be warmly welcomed to the reception and the luncheon.

The arranged programme, provided the times are strictly adhered to, will give four hours for the proceedings at the annual meeting.

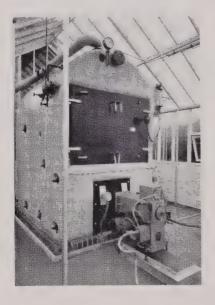
For the Luncheon the charge will be 25/- per head and those intending to be present are asked to make their ticket applications on the special forms which are to be provided and will be sent to all members along with the official notice and Agenda of the meeting.

Members who intend driving to London by car are reminded that the Connaught Rooms are situated in the "Pink Zone" but there are adequate car parking facilities at Lincolns Inn Fields, situated off Kingsway and opposite the entrance to Great Queen Street.

^{*}Amounts collected by spawn merchants are not for publication.

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FARM WALK IN FRANCE

A number of MGA members have suggested that a farm walk in France would receive good support and it is therefore proposed to

arrange such a walk in May.

The preliminary arrangements are that those who wish may travel from London to Lydd in Kent by private coach, and thence by charter plane to Lille or some other centre in France, thence by coach to some prominent farms in France including that of M. Andre Sarazin, followed by a short visit to Holland which would include the Floriade and, possibly, the Dutch Research Station if this could be arranged. For the return journey the plane would take off from Rotterdam.

Provided there are sufficient vacancies, wives and friends of members

will be welcome on the trip.

It is not possible to give exact costings but £30 per head may be

taken as a rough guide.

Some members may wish to take their own cars and these can be ferried by plane from Lydd at charges varying from £3 (single) for an 11ft. car to £9 for a 15ft. car plus a single fare for passengers of about £3 per head. On the other hand those members making the trip by coach and plane will be charged at about £10 per head for the London-Lille-Rotterdam-London round trip, plus coach tour and hotel expenses.



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